

US EPA ARCHIVE DOCUMENT

Maryland Nonpoint Source Program 2005 Annual Report

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I. Mission and Goals of the NPS Program

Maryland's mission is to implement effective nonpoint source pollution control programs. These programs are designed to achieve and maintain beneficial uses of water; improve and protect habitat for living resources; and protect public health through a mixture of water quality and/or technology based programs; regulatory and/or non-regulatory programs; and financial, technical, and educational assistance programs.

Through leadership and financial support the Maryland Section 319(h) Nonpoint Source (NPS) Program plays a lead role in helping to achieve protection and improvement of Maryland's water quality. The Program promotes and funds state and local watershed planning efforts, water quality monitoring, stream and wetland restoration, education/outreach, and other measures to reduce, prevent and track nonpoint source pollution loads. The NPS Program plays a key role in promoting partnerships and inter- and intra-governmental coordination to reduce nonpoint sources of pollution, and help bringing both the necessary technical and financial resources to local watershed management planning, best management practices, and restoration of streams and wetland habitats. Program partners include State and local government, Soil Conservation Districts, private landowners and watershed associations.

The NPS Program's three priority goals are:

- Reducing nonpoint source pollution;
- Restoring and protecting habitat (e.g., streams, riparian buffers and wetlands); and,
- Removing waters from the State's list of impaired waters (e.g. the 303(d))

II. Executive Summary

This report documents the activities and accomplishments of the State of Maryland in general and the Maryland Department of Environment's Environmental Protection and Restoration Program in particular regarding the administration of the State's Non-Point source funding. Maryland Department of Environment (MDE) plays a lead role in helping to achieve protection and improvement of Maryland's water quality by promoting and funding state and local efforts, water quality monitoring, stream and wetland restoration, education/outreach, and other measures to reduce and track nonpoint source pollution loads.

MDE is the lead agency responsible for coordination of policies, funds, and cooperative agreements with state agencies and local governments. Several other state agencies have key responsibilities, including the Departments of Natural Resources (DNR), Agriculture (MDA), Planning (MDP), and State Highway Administration (SHA). The NPS Program is housed within MDE's Technical and Regulatory Services Administration (TARSA).

In the past year, there have been notable program changes and successes. Progress was made in implementing best management practices in all nonpoint source areas through the provision of technical assistance, and project funding.

Highlighted Efforts

Corsica Targeted Watershed: The Corsica River was chosen as the Target Watershed. The Nonpoint Source Program has worked closely with local governments to focus implementation resources on watershed restoration projects designed to reduce nonpoint source loads and, in combination with other efforts, remove waters from the 303(d) list. This ongoing project will continue into 2007.

Watershed Restoration Action Strategies (WRAS): The WRAS program continued to make significant progress in developing and implementing comprehensive watershed plans. The WRAS Program provided local counties with extensive watershed technical assessment, capacity support and restoration services. The WRAS Program fine-tuned its watershed planning process in response to local government recommendations. With the completion of these WRASs, the state concludes its efforts to provide local governments with comprehensive technical watershed support, although some support maybe provided in some isolated situations. The WRAS program resulted in a total of 25 watershed plans.

Program Enhancement through Realignment: In an effort to strengthen the Maryland program's effectiveness and better align its goals with state and federal environmental objectives, the Maryland Section 319(h) Nonpoint Source Program 319(h) has been transferred from Maryland's Department of Natural Resources to the Maryland's Department of the Environment.

III. Overview

In Maryland, a complex web of water weaves its way through the State. Maryland is home to the Chesapeake Bay, the nation's largest estuary system, and the Coastal Bays that provide habitat for a wide range of aquatic life. Maryland has over 9,940 miles of non-tidal streams and rivers. Several major rivers (Monocacy, Patuxent, Potomac, Choptank, Nanticoke, Gunpowder, Pocomoke and Susequehanna) run through the state. Maryland's water resources provide food and water for its residents, jobs for the economy and a place where people may relax and enjoy the natural environment. Maryland's water resources are under stress from a variety of causes, with nonpoint source pollution the greatest single factor.

Maryland's rich heritage and the bounty of its waters are threatened by the very prosperity that continues to draw newcomers. Recreation, tourism, commercial and recreational fishing, wildlife habitats, and our quality of life are ultimately dependant upon healthy watersheds. Yet, the state's waters are increasingly impacted by and remain impaired due largely to nonpoint sources of pollution and related habitat degradation due to altered land uses.

What is NPS Pollution?

Nonpoint source pollution is defined as polluted runoff caused by stormwater (rainfall or snowmelt) or irrigation water moving over and through the ground. As this runoff moves, it picks up and carries away pollutants, such as sediments, nutrients, toxics, and pathogens. These pollutants are eventually deposited in lakes, rivers, wetlands, coastal waters, ground waters and the Chesapeake and Coastal Bays. Nonpoint source pollution is associated with a variety of land-

based activities including farming, logging, mining, urban/construction runoff, onsite sewage systems, streambank degradation, shore erosion, etc. Nonpoint source pollution is the main reason why many of Maryland's waters are considered "impaired." Impaired waters are those waters that do not meet Water Quality Standards for designated uses (e.g., fishing, swimming, drinking water, shellfish harvesting, etc.). The most recent Chesapeake Bay model associates nonpoint source pollution to the following land use categories:

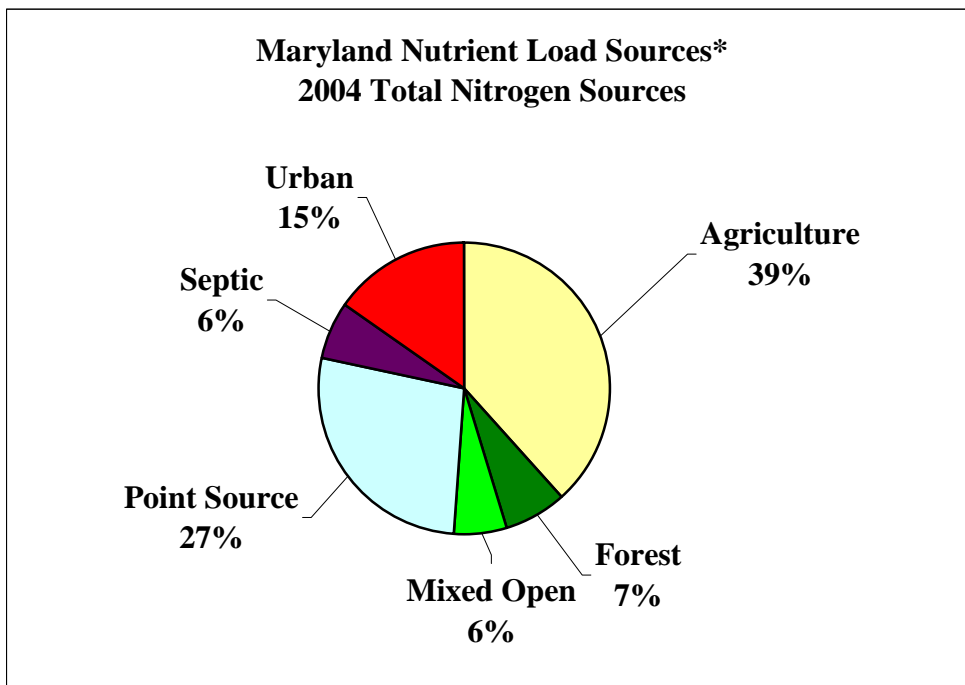


Figure 1: Chart showing the distribution of sources of nitrogen in Maryland

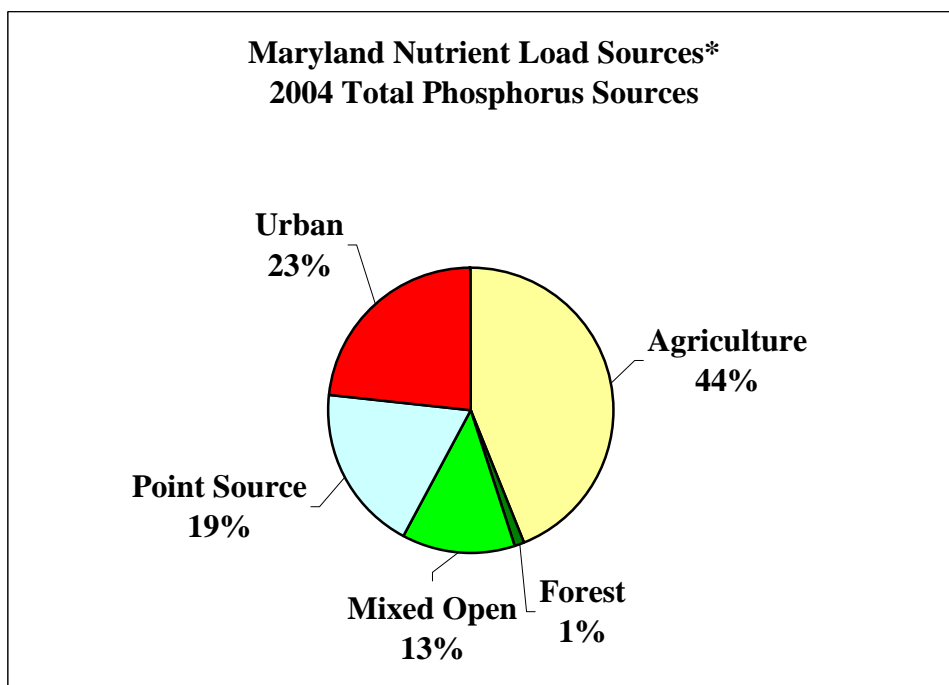


Figure 2: Chart showing the distribution of sources of phosphorus in Maryland

*Data referenced from the Phase 4.3 Chesapeake Bay Model. The reported statistics include all of Maryland lands within the Chesapeake Bay Watershed except the main body of the Bay.

Nonpoint Source Total Maximum Daily Load Implementation

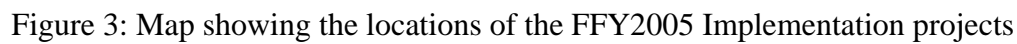
The Maryland Department of the Environment (MDE) is responsible for developing the state's list of impaired waters (i.e., the 303(d) list). MDE is also responsible for developing Total Maximum Daily Loads (TMDLs) for impaired waters. A TMDL establishes the maximum amount of a pollutant that a waterbody can assimilate and still meet Water Quality Standards. TMDLs allocate pollution loads for both point and nonpoint sources. TMDLs typically address a single pollutant (e.g., nutrients, sediment, fecal coliform) for each waterbody.

During 2005 MDE submitted 24 TMDLs to EPA for review and approval. In past years most TMDLs have addressed nutrient impairments in tidal waters of the State, which have significant nonpoint source implications. The vast majority of this year's TMDLs address fecal coliform bacteria in shellfish harvesting areas, which is also predominantly a nonpoint source problem. In support of these TMDL analyses, MDE is in the process of conducting bacteria source tracking (BST) studies to estimate the relative contributions by source category.

In addition to TMDL development activities, Maryland continues to advance TMDL implementation activities. Maryland recognizes that the 319(h) Program should address the restoration and protection of water quality standards under the Clean Water Act. MDE staff has continued to work with staff from local governments, under a Departmental Initiative, to begin providing technical assistance on incorporating nutrient TMDL implementation into local planning efforts. This technical assistance has focused on quantitative nonpoint source reduction.

IV. Major Accomplishments and Successes

In the past year, the NPS Program has had notable program accomplishments, successes and challenges. Progress was made in implementing best management practices in all nonpoint source areas through the provision of technical assistance, project funding or both.



Implementation Projects

Corsica River Targeted Watershed: At the end of 2003, representatives from Centreville, a small town near the tidal head waters of the Corsica River, coordinated with a diverse group of citizens and with MD Department of Natural Resources to develop a Watershed Restoration Action Strategy was funded by the EPA 319(h) program. This plan identifies needed implementation to address the TMDL and other restoration goals. Using funding from EPA 319(h) FFY 05, Maryland Bay Restoration Fund, Oyster Recovery Partnership, the National Fish and Wildlife Foundation, and the Chesapeake Bay Trust the stakeholders began to strategize and implement the objectives of the WRAS. See Appendix F for the WRAS Implementation Objectives.

This targeted watershed initiative included the following funded 319(h) projects, Agriculture Demonstration Project, Town of Centerville Demonstration Project, Maryland Department of Environment Monitoring Project and the Maryland Department of Natural Resources Monitoring Project. These projects were allotted approximately 30% of the funding available in the 2005 Grant Year. Each project is described below.

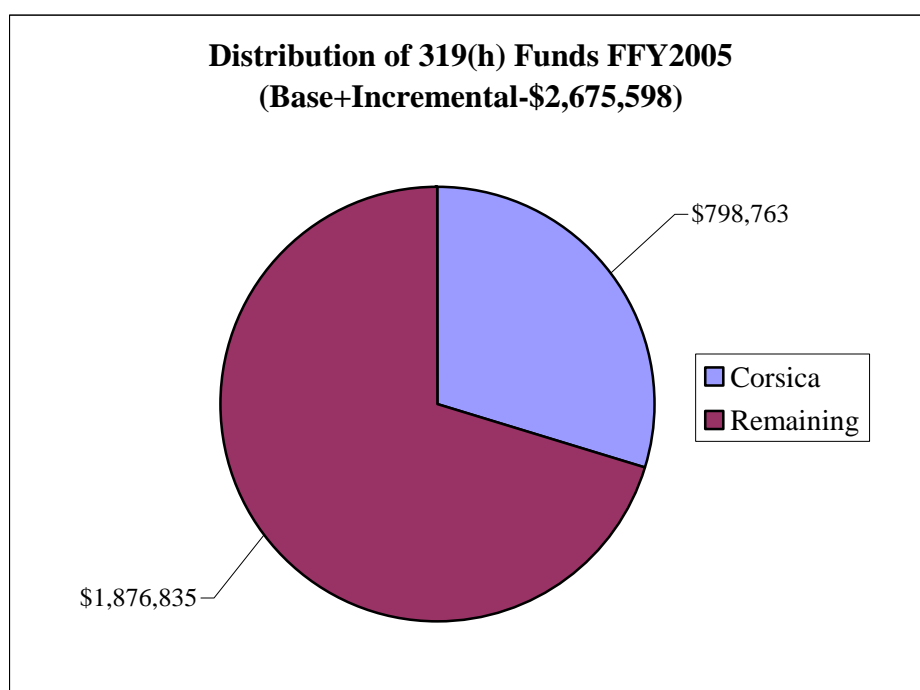


Figure 4: Chart showing distribution of Maryland's FFY 2005 319(h) funding between the Corsica Targeted Watershed Project and Remaining Projects

- Corsica River Watershed Restoration Project Agriculture Demonstration Project:** This project includes the Comprehensive treatment of agricultural non-point source pollution, the primary source of water quality impairment in this watershed. Agricultural landowners are targeted for increased technical assistance in the design and installation of best management practices (BMP) that emphasize sediment control and animal waste management. Strong emphasis is placed on the riparian forest buffers enhancement. This project also addresses the need for capacity assistance in order to facilitate and accelerate the implementation of best management practices, enhance the participation in Maryland's cover crop program and support other demonstration BMPs with particular focus on farmette horse pasture management demonstrations.

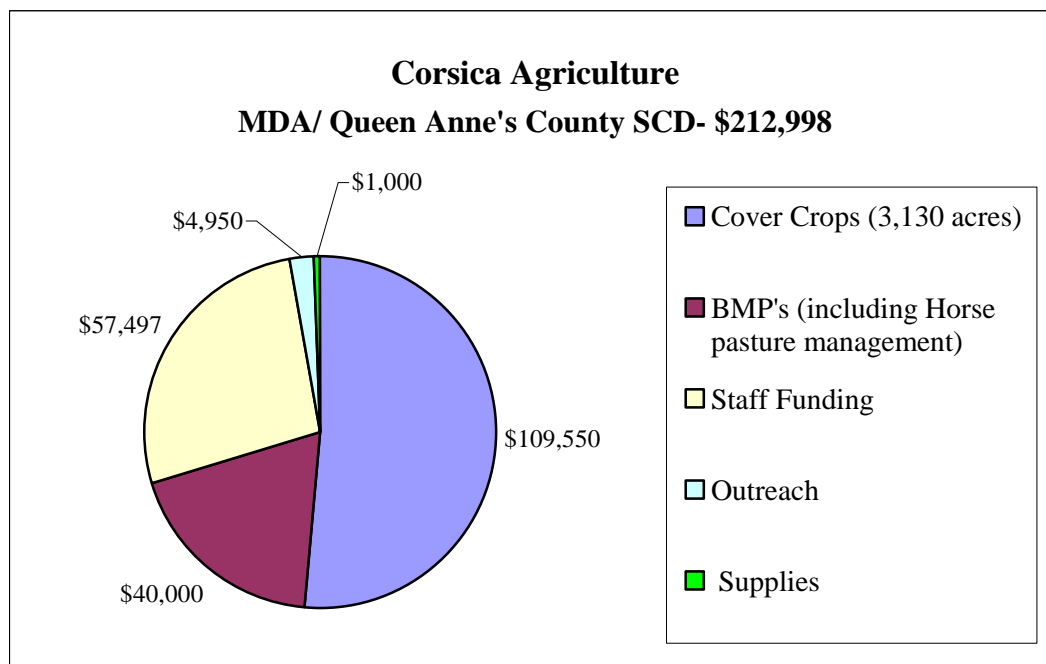


Figure 5: Chart showing the distribution of funds for the Corsica River Watershed Restoration Project- Agriculture Demonstration

- Corsica River Watershed Restoration Project Town of Centreville Demonstration Project:** This projects funds stormwater retrofit/stormwater management techniques such as wetland creation, riparian buffer plantings, and fish migration barrier removals if necessary. Wetlands, especially when constructed adjacent to waterways will provide added benefits of flood attenuation, sediment retention, and will slow storm water sufficiently to allow the stream system to heal unstabilized stream banks immediately downstream of the wetland area. Stormwater retrofits are easier to connect to an impacted area, as they generally are the immediate recipient of storm flow. This project also addresses the need for capacity assistance. It funds a watershed/grants manager and outreach manager to accelerate the application of urban code and programmatic development, outreach, and urban BMP's in this watershed. It is through this additional management capacity and technical support that water quality improvement, in both surface and ground water, will lead to improving the waters of the Corsica River. This project funds Programmatic Changes, to professionally review and recommend code

changes, programmatic changes, and local/state regulation changes. The effort also includes extensive public outreach and education and upfront participation in the process.

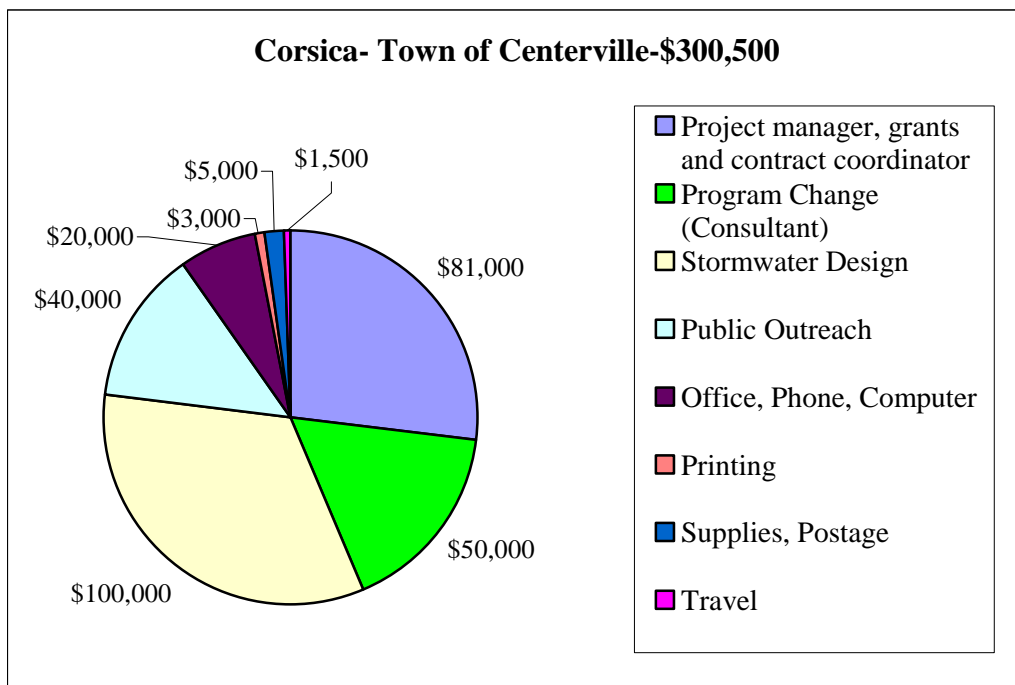


Figure 6: Chart showing the distribution of funds for the Corsica River Watershed Restoration Project-Town of Centerville Demonstration



Wastewater Treatment Plant Effluent Pond in the Corsica River Watershed



Spray Irrigation of Wastewater Treatment Plant Effluent in the Corsica River Watershed

- Corsica River Watershed Maryland Department of the Environment's Implementation Monitoring Project:** The goal of this project is to monitoring the effectiveness of retrofitting conventional OSDSs with nitrogen reducing technology in the Corsica watershed. This project will monitor the Town of Centreville's upgrade of 30 septic systems that lie in close proximity to impaired streams. Conventional systems that are currently permitted in the County discharge 40 - 60 mg/l of nitrogen (estimated N content in what flows from the whole septic system into the groundwater). There are existing systems that are installed in marginal soils, some are very poorly (if ever) maintained, some lie within 300 feet of a tributary stream or the edge of tidal water, and employ dated technology not capable of any significant nutrient reduction.

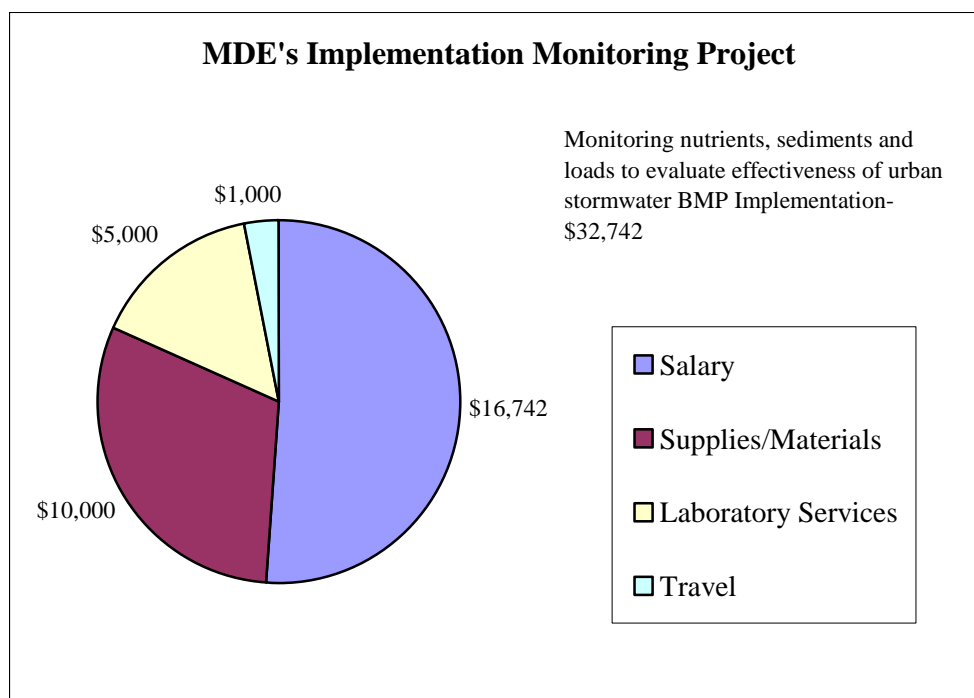


Figure 7: Chart showing the distribution of funds for the Corsica River Watershed Restoration Project- Maryland Department of the Environment's Implementation Monitoring



Monitoring Station along Gravel Run



Gravel Run in the Corsica River Watershed

- Corsica River Restoration Project Maryland Department of Natural Resources**
Monitoring for Interim and Post Project Water Quality: This project is a comprehensive monitoring project being conducted to assess early progress in the Corsica River Watershed Restoration Project and to provide feedback necessary to enhance the success of future watershed restoration projects which include: cover crop implementation results, stormwater bmp implementation results, and monitoring for living resource projections.

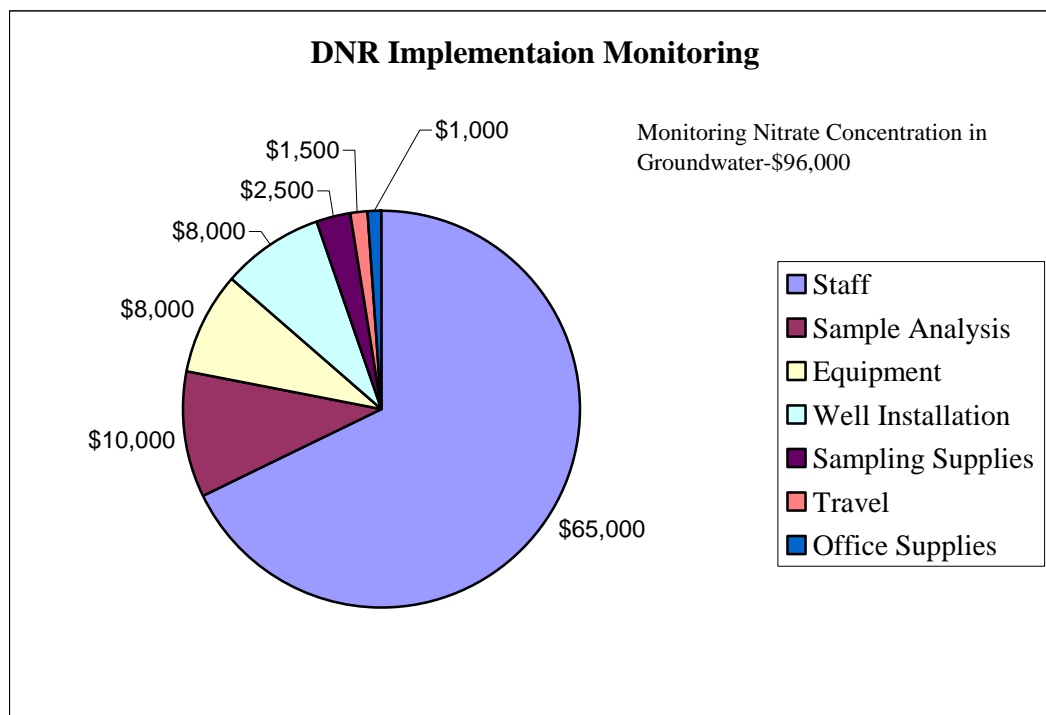


Figure 8: Chart showing the distribution of funds for the Corsica River Watershed Restoration Project- Maryland Department of Natural Resources Monitoring for Interim and Post Project Water Quality

Watershed Restoration Action Strategies Project: The WRAS Program provided local governments with extensive watershed technical assessment, support, and restoration services. The goal of WRAS-sponsored watershed planning was to protect and restore water quality and habitats. WRASs helped local governments to assess and prioritize environmental needs, and implement restoration and protection projects by providing a wealth of local-scale data to assist with priority setting. In addition, the WRAS program helped ensure all entities (MDE, DNR and MDA, SHA, etc.), were coordinating, targeting and leveraging their efforts in priority watersheds. Each year the WRAS Program, through a competitive process, selected five county or municipal governments to develop a WRAS. Each WRAS took two years to develop and thus ten WRASs were on going at any given time. The following watersheds were selected for funding during 2005.

- Assawoman Bay- located in Worcester County, the goal of the WRAS is to restore habitat and facilitate improvements in water quality
- Deer Creek- located in Harford County, the goals for this WRAS include preserving large blocks of contiguous forest land, maintain water quality in areas experiencing development, and establishing riparian buffers
- Miles River- located in Talbot County, the WRAS proposed to focus on Riparian Buffers and Stewardship and community engagement
- Prettyboy Reservoir- located in Baltimore County, the WRAS proposed to include the program change of zoning changes and development of better targeting mechanisms for existing agricultural preservation programs.
- Port Tobacco River located in Charles County, this WRAS includes the possible goals of achieving safe levels of bacteria, reducing nutrient loading by increasing protection of existing forest, and reducing sediment from stream bank erosion by restoring 50% of the eroding sites.

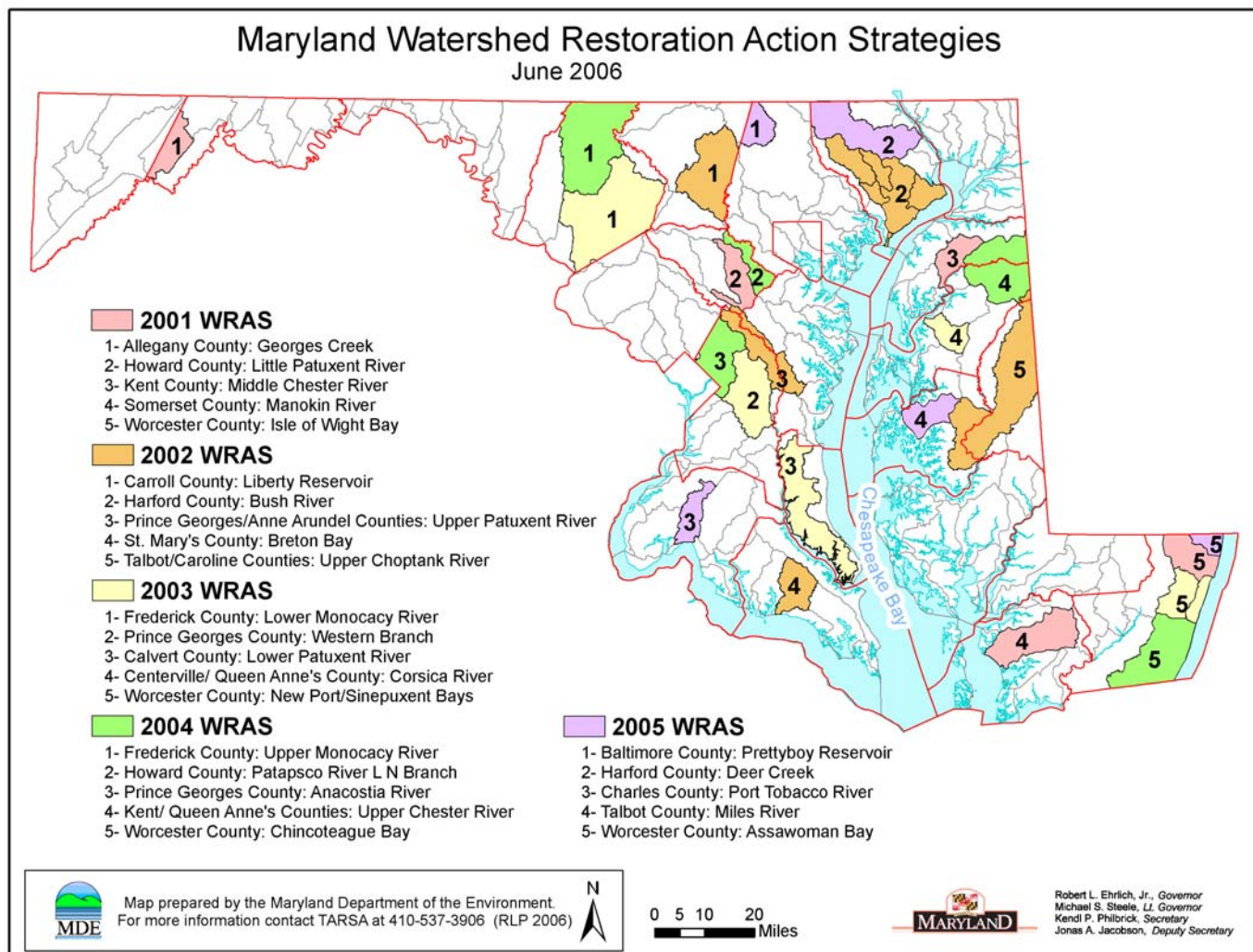


Figure 9: Map showing the locations of the WRAS watersheds

With the completion of the 2005 WRAS, Maryland brings to a close a successful comprehensive keystone program designed to support local governments with watershed planning. This program

significantly contributed to the State's Chesapeake Bay Program of having 2/3 of the Bay Watershed addressed with comprehensive watershed plans. The State will look to local governments, NGOs and others to help the state in watershed planning work.

Other Projects supported with 319(h) this year covered a variety of efforts aimed at habitat or water quality improvements. The status of all the projects can be found in Appendix E. The projects included:

Aaron Run Watershed Project: In this project the Maryland Bureau of Mines intended to design and construct best treatment technologies for acid mine drainage at four sites in the watershed. The construction of these treatment systems will abate the impacts of the presently uncontrolled discharge of acid mine drainage from four sites. With the abatement of these acid discharges, the mainstem of Aaron Run will recover good water quality capable of sustaining native fish populations. This project also planned to include the re-introduction of native brook and brown trout to the upper reaches isolated by several waterfalls in the watershed.

Lower Monocacy Watershed Restoration Project/ Linganore TMDL Urban Demonstration Project: The project supported riparian forest buffer enhancements and the use of onsite nonpoint source pollution reductions. Ongoing program assistance for landowners, information and outreach promoting urban best management practices, signage, and increased outreach activities for participation provides the framework to accomplish this comprehensive nonpoint source treatment. Additionally, the stormwater retrofits is intended to reduce runoff from impervious areas that contribute significantly to instream erosion.

Upper Choptank Cover Crop Program Project: This project established a Winter Cover Crop program in the Upper Choptank watershed for approximately 3,062 acres. This project built upon the State's current cover crop initiative that is inadequate to address the needs based upon C2K funding analysis.

Several supported projects are that which track achievements in BMP implementation:

Urban Stormwater Management Practices Database: This project continues to support the need for coordination and communication between jurisdictions regarding stormwater management data. This project fulfills the need to continue providing necessary information to the Chesapeake Bay Program.

Analyzing and Tracking Nonpoint Source Data: This ongoing project has successfully coordinated the consolidation of nonpoint sources Best Management Practices for inclusion in the Chesapeake Bay Watershed Model. It also achieved the goal of coordinating with other agencies concerning BMPs. See Appendix B for the tracked BMPs by major watershed.

Agricultural Programs: The following watersheds received funding for technical assistance and various BMP Implementation: Antietam Creek Target Watershed, Deer Creek, Lower Choptank, Lower Potomac- St Clements Bay, Upper Choptank, Marshyhope Creek and Nanticoke River. The funding for the projects supplies the continual need for capacity support. These individuals make the implementation of the BMPs as shown in Table 1 possible.

Table 1: Agriculture Programs 2005 Outcomes as proposed in Project Work Plans

Soil Conservation and Water Quality Plans (acres)	19,266
Nutrient Management plans (acres)	5,896
Soil Conservation and Water Quality Plans	218
Nutrient Management plans	48
Best Management Practices (General)	438
Stream Buffer (Forest) Plantings	12
Animal Waste Storage Structures	8
Stream Fencing (feet)	8,000
Water Troughs	7
Grassed Waterways	2
Stream Crossings	2
Conservation Cropping (acres)	1,000
Conservation Tillage (acres)	200
Cover Crops (acres)	150
CREP (acres)	306

Other Agricultural Programs: The implementation of agricultural programs [Nutrient Management, Maryland Agricultural Cost Share (MACS), Soil Conservation and Water Quality (SCWQ) Program, Conservation Reserve Enhancement Program (CREP)] continues to play a key role in reducing nonpoint source pollutants.

Maryland's Agriculture Programs

Good water quality is the most critical element in the overall restoration and protection of the Chesapeake Bay, the Coastal Bays and their tributaries for the support of living resources and to ensure safe drinking water supplies and other beneficial uses. Agricultural activity, human population growth, development activities, atmospheric deposition and septic systems are each contributing nonpoint source pollution in the form of sediment, nutrients and other potential pollutants which affect the State's surface and ground waters.

A strong agricultural industry and a healthy environment go hand in hand. As we move ahead into the future, agricultural and soil conservation partners will continue to preserve Maryland's rural legacy by developing and promoting farming practices that are both environmentally sensitive and economically sound. Maryland has a variety of agricultural programs (Nutrient Management Program, MD Agricultural Water Quality Cost Share Program, Soil Conservation and Water Quality Planning, Conservation Reserve Enhancement Program, Manure Transport Program, and Agricultural Water Management Program) described below that address the control and reduction of nonpoint source pollution.

Nutrient Management /Water Quality Improvement Act (WQIA)

In 1998, the Maryland General Assembly passed landmark legislation that placed Maryland at the forefront of national efforts to protect water quality. The Water Quality Improvement Act (WQIA) established both short and long-term strategies for reducing nutrient levels in our streams, rivers and Chesapeake and Coastal Bays. The most significant feature of the Act is a provision requiring nutrient management plans for virtually all Maryland farms. The WQIA changed the nutrient management program from its voluntary status to a regulatory program. It requires farmers who use chemical fertilizers to submit a nitrogen and phosphorus based nutrient management plan to the Maryland Department of Agriculture (MDA) by December 31, 2001 and implement it by December 31, 2002. Farmers who use animal manure or sludge must have and implement nitrogen based plans by the same dates as those who use chemical fertilizers. Those who have sludge or animal manure have until July 1, 2004 to submit phosphorus based nutrient management plans and must implement them by July 1, 2005. Although the law includes a number of deadlines and requirements, it also offers many new incentives aimed at helping farmers comply.

Maryland Agricultural Cost Share (MACS)

State and federal funds are used to provide grants to Maryland farmers for the installation of best management practices (BMPs) to address existing or potential water pollution conditions associated with farming activity. Farmers may receive up to 87.5% of the cost of approximately 30 eligible BMPs. For more detailed information on the program, see the MACS website at: <http://www.mda.state.md.us/resource/mawqca10.htm>.

Soil Conservation and Water Quality (SCWQ) Program

Soil Conservation and Water Quality (SCWQ) Plans are at the heart of Maryland's resource conservation and protection efforts. Developed and implemented through a local delivery network of soil conservation districts, these plans help farmers manage natural resources and identify and solve potential environmental problems while reaching optimal but sustainable production goals. SCWQ plans contain a menu of best management practices (BMPs) to help farmers prevent sediment, nutrients and fertilizers from impacting nearby waterways.

Conservation Reserve Enhancement Program (CREP)

Maryland was the first state to take advantage of the innovative Conservation Reserve Enhancement Program (CREP), which allows states to focus on natural resource issues of the greatest local concern. Under the program, Maryland landowners can protect sensitive streamside areas and highly erodible lands and restore wetlands. CREP provides annual rental payments for 10 –15 years and cost share for installing BMPS to conserve these sensitive resource areas. Since program initiation in October of 1997, Maryland landowners have protected over 71,200 acres of these sensitive lands through CREP enrollment and BMP installation.

Manure Transport Program

The Manure Transport Program provides support to animal producers who have excess manure and need to find alternative means of managing it in order to be in compliance with the WQIA. The two-fold objectives of the program include subsidizing the cost of transporting animal manure to make it affordable for animal producers to address excess manure and providing an incentive for the development of alternative technologies and business ventures to create a market for use of animal manures. See <http://www.mda.state.md.us/nutrient/transport.pdf> for more information.

Operations receiving manure for land application under the program must apply it in accordance with a nutrient management plan prepared by a certified consultant. Receiving operations with alternative uses for manure are also eligible to participate. Current alternatives to direct land application include the use of poultry litter as a substrate for growing mushrooms and the manufacture of fertilizer pellets by Perdue Agri-Cycle for use in landscaping and shipment to other regions of the country. To date, practically all of the manure transported has been poultry litter. Reimbursement for all participants is capped at \$20 per ton. Livestock producers receive up to 87.5% of transport costs from public funds.

Agricultural Water Management Program

The Maryland Department of Agriculture (MDA) regulates agricultural public drainage facilities administered as Public Drainage Associations (PDAs). PDAs are independent political subdivisions with local taxing authority and cover over 850 miles of drainage ditches in the coastal zone, mostly on the Eastern Shore. The PDAs are required to develop and implement approved operation and maintenance plans that address sediment control and water quality protection. MDA assists PDAs to conduct biannual inspections and provides technical assistance through the SCDs. Typical best management practices include vegetative filter strips and channel stabilization.

Nonpoint source program incremental funds that went towards implementation of innovative BMPs were leveraged by State funds and local funds raised through taxing landowners beneficiaries. The Soil Conservation Districts, PDA Coordinators and National Resource Conservation Service (NRCS) engineers' time in planning, design, permit applications, construction checks and final approval were all services provided as in-kind and free to landowners and PDAs.

V. Areas of Concern/Recommendations/Future Actions

Key challenges addressed by the NPS Program in collaboration with other state efforts include:

Urban/Suburban Nonpoint Source Pollution is increasing: Maryland has seen tremendous population growth over the last 20 years. As more land becomes developed, there has been an increase in the urban/suburban component of nonpoint source pollution to our rivers and bays. The Maryland Department of the Environment has been promoting new and innovative practices to control stormwater through environmentally sensitive design techniques described in the "2000 Maryland Stormwater Management Manual." This manual promotes innovative design measures (e.g., sheet flow to buffers, natural conservation, reduction of impervious area, open section roadways and grass swales, etc). These design techniques are targeted to new

development. There is also a need to address development built before modern stormwater regulations took effect.

Reducing nutrient and sediment pollution: Nutrient and sediment pollution are the main reason our waterways remain impaired. These pollutants are the foremost threats to the state's living resources. Although significant progress has been made in reducing nutrient and sediment pollution, significant progress still needs to be made to meet Chesapeake Bay 2000 agreement and Coastal Bays management plan nutrient reduction goals.

Resource Constraints/Measurable Environmental Results: As federal and state budgets grow tighter, there is a push for all programs to demonstrate their effectiveness at producing results. The national Nonpoint Source Program is under pressure to demonstrate program effectiveness through measurable environmental results. Over the past few years, the Maryland NPS Program has focused on a watershed approach to help local government effectively leverage their resources to meet environmental goals and objectives. In the future, the NPS Program will selectively target program resources to aid efforts aimed at removing waters from the impaired waters list.

Throughout the years EPA 319(h) funding has supported the implementation of BMPs and has accomplished the nutrient and sediment reduction that is so needed to clean the waters of the Chesapeake Bay. In the Maryland Department of Environment's Managing For Results Workplan the estimated nutrient and sediment load reductions are shown in Table 2.

Table 2: Annual Nutrient and Sediment Load Reductions associated with EPA 319(h) grant projects (Data is annual not cumulative)

Performance Measure	FFY05 Actual	FFY06 Estimated ¹	FFY07 Estimated
Nitrogen Reduction (lbs/yr)	122,000	25,500	26,775
N Reduction Cost (dollar/lb/yr) ²	\$11	\$57	\$54
Phosphorus Reduction (lbs/yr)	1,000	950	1,000
Sediment Reduction (tons/yr)	39,000	42,900	45,045
Sediment Reduction Cost (dollar/lb/yr) ²	\$35	\$34	\$32

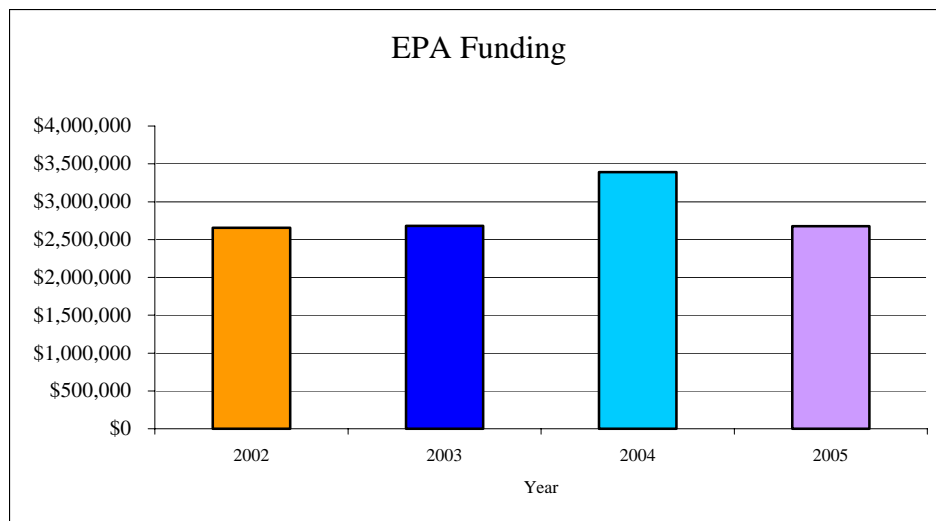
Movement toward implementation away from planning: With NPS Program move to MDE, new staff, new initiatives and new program focuses has ensued. The 319(h) focus has been shifted away from funding watershed planning to implementation. This may impact future EPA 319(h) funding throughout the state because all implementation funded by EPA 319(h) needs to occur in areas that have watershed plans that have their a-i requirements. Watershed planning brought people together to discuss the problem faced in a watershed and provide them with an opportunity to address potential corrections. Any new planning may be through Tributary Strategy Implementation Planning, and Water Resources Element in Comprehensive Plans.

¹ Maryland's Bay Restoration Fund provides a new dedicated funding source for cover crops.

² Uses only the implementation portion of grant funding, \$1,380,000 for FFY05 and \$1,455,00 for FFY06 and FFY07

Appendix A: Financial and Contact Information

A. Amount of EPA 319(h) funding from 2002 to 2005



Year	EPA Funding
2005	\$2,675,598
2004	\$3,391,964
2003	\$2,678,890
2002	\$2,654,500
Total	\$11,400,952

B. List of Agency Cooperators

1. State Lead Agency

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Appendix B: 2004 BMP Progress Implementation on Maryland from the Analyzing and Tracking Nonpoint Source Data Project

	Choptank River	Lower Eastern Shore	Lower Potomac River	Lower Western Shore	Middle Potomac River	Patapsco / Back River	Patuxent River	Upper Eastern Shore	Upper Potomac River	Upper Western Shore	Statewide Total
Erosion and Sediment Control	54	1,136	410	4,321	11,740	5,893	8,457	184	2,491	3,477	38,163
Dry Detention Ponds and Hydro Structures	745	1,511	2,292	4,180	3,775	12,190	1,723	1,763	11,257	12,902	52,337
Dry Extended Detention Ponds	193	71	574	3,601	1,035	7,454	1,748	141	6,185	5,152	26,154
Filtering Practices	37	111	150	56	186	867	404	63	288	1,259	3,421
Infiltration Practices	161	360	316	3,228	555	3,010	2,743	110	1,786	1,388	13,659
Wet Ponds	600	5,709	3,700	4,375	5,381	9,683	8,416	2,097	4,428	4,948	49,338
Septic Connections to Sewers	485	796	697	332	0	977	220	4,461	2,008	570	10,546
Septic Denirification	0	1	3	188	1	101	112	1	1	6	412
Tree Planting on Agricultural Lands	1,020	1,662	28	42	86	201	182	1,701	2,144	986	8,051
Animal Waste Management Systems-Livestock	48	29	17	4	12	43	43	132	627	101	1,056
Forest Harvesting Practices	871	2,563	917	97	100	253	327	552	2,453	867	8,999
Animal Waste Management Systems-Poultry	151	844	0	0	0	0	0	69	11	0	1,075

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	Choptank River	Lower Eastern Shore	Lower Potomac River	Lower Western Shore	Middle Potomac River	Patapsco / Back River	Patuxent River	Upper Eastern Shore	Upper Potomac River	Upper Western Shore	Statewide Total
Cover Crops	8,123	14,257	1,643	535	1,710	556	1,820	13,220	7,048	3,417	52,328
Grassed Buffers	11,314	12,893	641	12	50	474	273	6,475	1,391	185	33,708
Runoff Control	5	4	19	5	1	42	160	37	168	274	715
Stream Restoration	655	1,203	1,509	2,652	22,527	17,110	7,675	3,497	15,602	34,405	106,835
Forest Conservation	1,119	2,135	9,463	2,254	8,532	4,150	14,520	6,553	3,196	9,199	61,121
Tree Planting on Mixed Open Lands	12	17	213	465	548	408	1,236	60	422	197	3,578
Riparian Forest Buffers on Ag Lands	1,028	7,091	642	49	420	663	658	1,652	4,490	1,144	17,836
Riparian Forest Buffers on Urban Lands	3	0	26	47	55	63	73	33	33	10	343
Retirement Of Highly Erodible Lands	316	52	1,015	43	753	837	661	3,412	4,491	671	12,251
Soil Conservation Water Quality Plans	107,282	166,907	26,611	3,011	37,189	16,274	51,525	114,556	182,897	79,836	786,088
Nutrient Management Plan Implementation	237,216	381,086	70,935	13,213	39,086	55,417	76,129	389,919	343,882	153,889	1,760,773
Stream Protection w/Fencing	0	0	2	12	121	27	341	42	818	279	1,642
Stream Protection w/o Fencing	0	0	50	606	175	5,815	6,441	225	1,260	12,323	26,895
Wetland Restoration on Ag Lands	1,461	2,527	164	5	35	102	90	1,681	195	188	6,448

Appendix C: General Approach and Schedule to Implement Applicable Management Measures

Category	Priority	Implementation Timeline (Years)		
		1998-2002	2003-2007	2009-2012
Agriculture	Statewide	<p>Farmers using commercial fertilizers must have n & P based plans by 2002</p> <p>Farmers using animal manure or sludge must have n & P based plans by 2002</p>	<p>Soil Conservation Water Quality Plans (SCWQP) on 50% of all farms by 2003</p> <p>SCWQP implemented on 25% of all farms by 2003</p> <p>Farmers using animal manure or sludge must have n & P based plans by July 1, 2004</p>	
	Watershed Focus	<p>Tributary Strategies</p> <p>Agricultural Priority Watersheds**</p>	Agricultural Priority Watersheds**	
Forestry	Statewide	Riparian Forest Buffer (RFB) goal of 43 miles per year	Riparian Forest Buffer (RFB) goal of 43 miles per year	600 miles of created RFB by 2010
	Watershed Focus	<p>Coastal Bays</p> <p>Special Streams Project</p> <p>Monocacy</p> <p>Anacostia</p> <p>Susquehanna</p> <p>Town Creek</p> <p>Rock & Carroll Creek</p>		
Urban runoff: developing and developed areas	Statewide			
	Watershed Focus	<p>Washington - Baltimore Metro Area, Roland Run, Redhouse Run, Severn River SWM plan</p> <p>Anacostia Watershed</p>		

From "Maryland Nonpoint Source Management Plan December 1999"

Category	Priority	Implementation Timeline (Years)		
		1998-2002	2003-2007	2009-2012
Marinas and Recreational Boating	Statewide	96 Certified Clean Marinas by 2002	125 Certified Clean Marinas by 2004	270 Certified Clean Marinas by 2010 Marine Sewage Pumpout Program goal of 460 facilities by 2010
	Watershed Focus	Chesapeake Bay Coastal Bays Deep Creek Lake		
Channelization and Channel Modification, dams, and shoreline erosion	Statewide			
	Watershed Focus	Chesapeake Bay Shoreline CWAP Priority Watersheds Anacostia Northwest Branch Town Park Stream		
Wetlands	Statewide	3000 acres by 2002	10,500 acres by 2007	15,000 acres by 2010
	Watershed Focus	CWAP Priority Watersheds Coastal Bays		

From "Maryland Nonpoint Source Management Plan December 1999"

Appendix D: Future 319(h) funding projects for FFY06

Project Name	Estimated Award
Corsica Restoration Capacity, Program Change, Stormwater Management Implementation	\$300,500
Corsica River Capacity Development	\$63,448
NPS Program Coordination and Grants Management	\$380,184
Targeted Watershed TMDL Implementation Evaluation	\$331,179
Tracking and Analyzing NPS Data	\$185,322
Bennett Creek Watershed Urban Wetlands Program Pilot	\$71,300
Corsica Monitoring, Cover Crops, Stormwater Management, Living Resources	\$184,140
Corsica LID Standards, Code Revisions, GIS, SWM	\$152,000
Aaron Run Remediation	\$366,566
Urban SWM Database	\$51,763
Laurel Valley Stream Restoration	\$140,000
Bioswale Demo with Enhanced Soil Porosity for SWM	\$228,500
Lower Potomac Ag Implementation	\$46,402
West Chesapeake Coastal Plain Stream Restoration Targeting	\$165,361
Corsica Monitoring OSDS and SWM BMPs	\$30,415
Ag Data Mgmt for TMDL and Trib Strategies	\$66,702
Antietam Creek Watershed Project	\$136,064
Lower Monocacy Ag Implementation	\$35,000
Liberty Reservoir Targeted Watershed Project	\$15,030
Lower Choptank SCWQ Technical Assistance	\$39,677
Upper Choptank Technical Assistance	\$58,184
Deer Creek SCWQ Technical Assistance	\$47,922
Marshyhope/ Nanticoke SCWQ Technical Assistance	\$37,035
Gwynns Falls at Chartley Stream Restoration	\$480,000
Water Element in Comprehensive Plans and HB1141	\$30,456
ID Impairments Stressors	260,330

Appendix E: FY 2005 Project Status as Reported in GRTS through 8/27/06

B = Behind Schedule

C = Completed

O = On schedule

R = Revised

(Dates in parenthesis are the date each Project's status was recorded in GRTS)

01-NPS Program Coordination and Grant Management	C: 6/30/06
02-Targeted Watershed Project and TMDL Implementation	B: Extension requested to 12/31/06.
03-Analyzing and Tracking Nonpoint Source Pollution in Maryland	C: 6/30/06
04-Urban Stormwater Management Practices Database	B: (6/30/06) Reports to be submitted to Bay Program & 319 Program by 08/31/06.
05-Antietam Creek Targeted Watershed Project	B: (7/20/06) Q4 and Final to be submitted by 8-31-06
06-Deer Creek Agricultural Soil Conservation and Water Quality Technical Assistance	B: (7/20/06) Awaiting Q4 and Final Report from MDA.
07-Lower Choptank Agriculture Soil Conservation and Water Quality Technical Assistance	B: (6/19/06) Due to a vacancy during the Project period, MDA has requested an extension to 12/31/06.
08-Lower Potomac Watershed Project - Implementing the Agricultural Tributary Strategy in St. Clements Bay	B: (7/20/06) Awaiting Final Report from MDA.
09-Upper Choptank Watershed Agricultural Technical Assistance	O: (7/31/06) Project started 10/01/05
10-Marshyhope Creek and Nanticoke River Watershed Agricultural Soil Conservation and Water Quality Technical Assistance Project	C: 6/30/06
11-Agricultural Data Management	R: New start date 10/1/05. O: (8/6/06)
12-Corsica River Watershed Restoration Agriculture Demonstration Project	B: (7/31/06)
13-Corsica River Watershed Restoration Town of Centreville Demonstration Project	R: New start date 04/01/06
14-Corsica River Watershed MDE's Implementation Monitoring Project	B: (8/1/06)
15-Corsica River Restoration Project Monitoring for Interim and Post Project Water Quality and for Living Resource Projections	R: (8/1/06) New start date 4/1/06
16-Watershed Restoration Action Strategy (WRAS) Projects Miles River Watershed and Assawoman Watershed	R: (8/2/06) New start date 4/1/06
17-Aaron Run Watershed Remediation Project	O: (8/5/06)

18-Lower Monocacy Watershed Restoration Project Linganore TMDL Urban Demonstration Project	B: (8/5/06)
19-Upper Choptank Cover Crop Demonstration Program	O: (8/4/06)

Appendix F: Corsica Implementation Strategies from the *Corsica River Watershed Restoration Action Strategy*

Implementation Strategies & Recommendations	Party responsible for meeting management objective	Schedule	Measurable indicators/performance measures	Monitoring and party responsible for monitoring	Public involvement, outreach, or education component	Innovations or additional leverage or benefit
1. Market and early planting incentive, commodity, small grain, cover crop. Goal: 3000 demonstration acres.	Queen Anne's County Soil Conservation District (QA SCD).	Outreach: Fall 2004. Implementation: 2005 to 2007. Monitoring: 2005 to 2007.	Pounds of nutrients reduced. Number of farmers and number of acres enrolled. Quarterly reports and tracking of acreages	Paired watershed study: Maryland Department of Natural Resources. Ground water test wells: University of Maryland Cooperative	QA SCD aggressive enrollment initiative. Presentation of data results to public, other watersheds, and MD DNR WRAS web site.	Pro-rated early planting incentive: \$17/acre early planting, \$12/per acre later planting. Provides financial incentive to farmers to plant cover crops earlier to achieve greater nutrient uptake.
3. Demonstration, whole farm nutrient and horse pasture management for farmettes of less than 10 acres each. Goal: 50 demonstration acres.	QA County SCD, the Chester River Association, and the Alliance for the Chesapeake Bay.	Outreach: Fall 2004. Implementation: 2005 to 2007. Tier I BMP's in 2005, Tier II BMP's in 2006. Monitoring: 2005 to 2007.	Reduction in concentration of sediment, nutrients, bacteria in surface and ground water. Number of demonstration BMP's. Quarterly reports and tracking of farmette acreage enrolled.	Paired watershed study. Pre and post sampling: Maryland Department of Natural Resources. Ground water test wells: University of Maryland Cooperative Extension.	QA SCD enrollment initiative. Presentation of results to public, other Maryland/Bay watersheds, and MD DNR WRAS web site.	A "gap" closer. Demonstrates small farmette management techniques. Currently, these farmettes fall outside of traditional nutrient management programs.
2. Agriculture nutrient and sediment reducing stream buffers. Goal: 30 demonstration acres.	Queen Anne's County Soil Conservation District.	Outreach: Fall 2004. Implementation: 2005 to 2007. 15 acres by 2005. 15 acres by 2006. Monitoring: 2005 to 2007.	Number of acres buffered. Change in concentration of nutrient and sediment levels in surface waters. Quarterly reports tracking numbers of acres enrolled.	Tracking of buffered acres: Queen Anne's County Soil Conservation District. Paired watershed study. Pre and post sampling for nutrients and sediment: Maryland Department of Natural Resources.	QA SCD aggressive enrollment initiative. Presentation of results to public, other MD/Bay watersheds, and MD DNR WRAS web site.	A "gap" closer. Demonstrates buffer development and management techniques. Currently, these unbuffered areas fall outside of traditional buffer program criteria.

Appendix F: Corsica Implementation Strategies from the *Corsica River Watershed Restoration Action Strategy*

Implementation Strategies & Recommendations	Party responsible for meeting management objective	Schedule	Measurable indicators/performance measures	Monitoring and party responsible for monitoring	Public involvement, outreach, or education component	Innovations or additional leverage or benefit
12. EcoTeams: Public awareness, education, involvement, and capacity building:	Chester River Association, Alliance for the Chesapeake Bay, the Chesapeake Bay Conservation	Outreach planning: Fall 2004. EcoTeam recruitment: 2004 to 2005.	Measuring/tracking homeowner behavior change as education process unfolds. Number of Eco-teams, number of active participants on EcoTeams, number of workshops, and meetings.	Number of acres buffered, estimate of load reductions: Queen Anne's County Soil Conservation District.	Public will be involved in: - neighborhood based EcoTeams. - education workshops - demonstration projects.	A "gap" closer. This project has the potential of reaching EVERY person in the watershed thus having a significant potential to affect water quality.
10. Suburban marsh (2 sites) and stream (2 sites) buffer projects (200 citizens).	Landscaping Council, and the Queen Anne's County Soil Conservation District.	Capacity building and educational initiatives: 2004 to 2006.	Number of demonstration projects (marsh and stream acres buffered, homes landscaped). Pounds of fertilizers and pesticides reduced, gallons of water conserved in homes.	Behavior change measurements, participant involvement, household pollution reduced: Chester River Association and the Alliance for the Chesapeake Bay.	Volunteer citizens participate to demonstrate "Extreme" conservation makeover for environmentally friendly landscaping.	Currently, these nonbuffered areas fall outside of traditional buffer program criteria.
8. Native conservation landscaping demonstration project (200 citizen participants).		Site selection, and project planning: Fall 2004. Implementation of Demonstration projects: Summer 2005.	Number of referrals to restoration consultants.		Citizen involvement in television documentary and homeowner behavior change program.	Builds capacity to develop and manage buffers, reduce pollutants, affect behavior change in others.
4. Household pollution reduction, citizen survey, and behavior change projects (watershed – 3700 people).		Monitoring: Fall 2005 to 2007.	Implementation of "Extreme" conservation landscape makeovers. EcoTeams workbook. Production of documentary.			Demonstrates stream and marsh buffer development and management techniques in tidal areas.

Appendix F: Corsica Implementation Strategies from the *Corsica River Watershed Restoration Action Strategy*

Implementation Strategies & Recommendations	Party responsible for meeting management objective	Schedule	Measurable indicators/performance measures	Monitoring and party responsible for monitoring	Public involvement, outreach, or education component	Innovations or additional leverage or benefit
7. Low Impact Development (LID), ordinance and code change research, development, and adoption. Will directly improve Corsica River's water quality and provide collateral flood control.	Town of Centreville	<p>Number of Public Roundtables.</p> <p>Code and Ordinance development: Fall 2004 to 2005</p> <p>Adoption and implementation of code changes: 2005.</p>	<p>Acres reduction of impervious surfaces within the town limits.</p> <p>Projected percent increase in vegetative buffer within town limits.</p> <p>Projected utilization of LID techniques.</p> <p>Projected pounds of nutrients reduced from LID technique application.</p>	<p>Projection of nutrients and sediments reduced as a result of code changes: Town of Centreville.</p> <p>Projection of percent change in watershed imperviousness: Town of Centreville.</p>	Public inclusion in Roundtables to gather input and feedback.	Town of Centreville is at the headwaters of the Corsica. Innovative LID application (greenroofs, reduction of impervious surfaces, elimination of curb and gutter, swales, street narrowing, bio-retention areas, rain gardens, etc.), will prevent water quality degradation as infill begins to occur in this designated growth area.
13. Chester River turbidity reduction and reintroduction of Oyster reef ecosystems. Note** This is contingent on survey. No funding is requested for this effort.	Shellfish Program, Fisheries Service, Maryland Department of Natural Resources.	<p>Survey historic oyster beds for oyster suitability: Spring 2004. Convene and collaborate with County Oyster Committee to close an area as a sanctuary: Spring 2005. **</p> <p>Plant oyster habitat and or seed, 2005. **</p>	<p>Survey of historic site. Measurement of site suitability. Pending suitability: oyster viability.</p> <p>Measurement of turbidity after oyster reef is established.</p>	Survey, collaboration activities, habitat and seed planting: Shellfish Program, Fisheries Service, Maryland Department of Natural Resources.	Oyster gardening with citizen groups.	Historically oysters filtered the Chesapeake Bay water column in three days. Oysters can greatly affect turbidity, thus light, and thus the growth of beneficial submerged aquatic vegetation. The establishment of oysters in the Corsica River could play an innovative role in water quality (turbidity) improvement.

Appendix F: Corsica Implementation Strategies from the *Corsica River Watershed Restoration Action Strategy*

Implementation Strategies & Recommendations	Party responsible for meeting management objective	Schedule	Measurable indicators/performance measures	Monitoring and party responsible for monitoring	Public involvement, outreach, or education component	Innovations or additional leverage or benefit
5. Main stem of the Corsica River: Water quality monitoring.	Tidewater Ecosystem Assessment Service, Maryland Department of Natural Resources.	Buoy acquisition and deployment: 2004. Viable data stream and link to Eyes on the Bay Web Site: 2004/2005.	Every 15 minutes: salinity, dissolved oxygen, turbidity, pH, chlorophyll, temperature. Nutrient data will be collected every week.	Continuous monitoring every 15 minutes: salinity, d.o., turbidity, pH, chl, temperature. Weekly monitoring: nutrients. Tidewater Ecosystem Assessment Service, MD DNR.	All data interactively displayed on the Eyes on the Bay Web Site.	Measure success of cumulative land and water based management actions via temporally and spatially intensive monitoring station in Corsica River main stem.
9. Easements incentive program.\$924/acre.Incentive bonus\$1,848/ac.	Town of Centreville in partnership with conservation partners	Outreach and implementation: Fall 2004 to 2007.	Projected pounds nutrients reduced through change in land use and acreage conserved	Enrollment outreach and monitoring: Conservation easement holders.	Meetings with individual landowners.	Market incentive based plans.
11. Septic System Retrofits	Queen Anne's County Health Department & Upper Eastern Shore Trib. Team	Fall 2004 program discussions. Implementation 2005	Water quality samplings from completed systems	Queen Anne's County Health Department	Septic brochure and public workshops by Trib. Team & information promulgated by QAC P&Z	Establishes a tracking method for septic effluent, incentivizes system maintenance and broad public outreach.

*Cost estimates used above are taken from The Technical reference for Maryland's Tributary Strategies October 2002 and from local engineering estimating practices.